Claims

1. An apparatus for improving circulation of blood in a patient's extremity, comprising:

   A. a rigid enclosure adapted to enclose the patient's extremity, said enclosure comprising an opening adapted to receive the patient's extremity into the rigid enclosure;

   B. a flexible enclosure within the rigid enclosure, said flexible enclosure configured to extend circumferentially around the patient's extremity when the extremity is inserted into the rigid enclosure;

   C. a source of compressed gas connected with the flexible enclosure, said source of compressed gas being operable to discharge gas and inflate the flexible enclosure with the gas;

   D. a pilot control valve connected between the source of compressed gas and the flexible enclosure, said pilot control valve operable in an open position to permit the flow of gas into the flexible enclosure, and a closed position to prevent the flow of gas into the flexible enclosure;

   E. a monitor operably connected with the pilot control valve, said monitor being operable to detect the patient's arterial pulse and open the pilot control valve in response to detection of said arterial pulse;

   F. an adjustable control valve connected between the pilot control valve and the flexible enclosure, said adjustable control valve being operable to regulate the flow of gas into the flexible enclosure; and

   G. a pressure sensor operably connected with the plastic enclosure and adjustable control valve, said pressure sensor operable to measure the pressure in the flexible enclosure and adjust the flow of compressed gas into the flexible enclosure in response to the pressure measured in the flexible enclosure.

2. The apparatus of claim 1, wherein the monitor comprises a computerized

EKG monitor.

3. The apparatus of claim 1, wherein the compressed gas is air, and the source of compressed gas comprises an air compressor operable to pump air into the flexible enclosure.

4. The apparatus of claim 3, wherein the pressure sensor is operably connected with the air compressor to adjust the flow of compressed air from the air compressor into the flexible enclosure.

5. The apparatus of claim 1, comprising a pressure storage tank between the source of compressed gas and the flexible enclosure.

6. An apparatus for use with a source of compressed gas to improve the circulation of blood in a patient's extremity, said apparatus comprising:

   A. a rigid enclosure adapted to enclose the patient's extremity, said enclosure comprising an opening adapted to receive the patient's extremity into the rigid enclosure;

   B. a flexible enclosure within the rigid enclosure, said flexible enclosure configured to extend circumferentially around the patient's extremity when the extremity is inserted into the rigid enclosure;

   C. a valve assembly configured for connection between the source of compressed gas and the flexible enclosure, said valve assembly operable in an open setting to permit the flow of gas from the source of compressed gas into the flexible enclosure, and a closed setting to prevent the flow of gas from the source of compressed gas into the flexible enclosure;

   D. a monitor operably connected with the valve assembly, said monitor being configured to detect the patient's arterial pulse and switch the valve assembly to the open setting in response to detection of said arterial pulse; and

   E. a pressure storage tank connected between the source of compressed gas and the valve assembly, said pressure storage tank having an inlet connected with the source of compressed gas and an outlet connected with the valve assembly.

7. The apparatus of claim 6, wherein the monitor comprises a computerized EKG monitor.

8. An apparatus for improving circulation of blood in a patient's extremity, comprising:

   A. a rigid enclosure adapted to enclose the patient's extremity, said enclosure comprising an opening adapted to receive the patient's extremity into the rigid enclosure;

   B. a flexible enclosure within the rigid enclosure, said flexible enclosure configured to extend circumferentially around the patient's extremity when the extremity is inserted into the rigid enclosure;

   C. a source of compressed gas connected with the flexible enclosure, said source of compressed gas being operable to discharge gas and inflate the flexible enclosure with the gas;

   D. a pilot control valve connected between the source of compressed gas and the flexible enclosure, said pilot control valve operable in an open position to permit the flow of gas into the flexible enclosure, and a closed position to prevent the flow of gas into the flexible enclosure;

   E. a monitor operably connected with the pilot control valve, said monitor being operable to detect the patient's arterial pulse and open the pilot control valve in response to detection of said pulse;

   F. an adjustable control valve connected between the pilot control valve and the flexible enclosure, said adjustable control valve being adjustable to regulate the flow of compressed gas into the flexible enclosure; and

   G. a pressure storage tank connected between the source of compressed gas and the flexible enclosure.

9. The apparatus of claim 8, wherein the monitor comprises a computerized EKG monitor.

10. The apparatus of claim 8, comprising a valve stem extending from the adjustable control valve for manually regulating the flow of compressed gas into the flexible enclosure.

11. The apparatus of claim 8, comprising a pressure sensor configured for measuring the pressure in the flexible enclosure, said pressure sensor being operably connected with the adjustable control valve to adjust the flow of compressed gas into the flexible enclosure in response to the pressure measured in the flexible enclosure.

12. The apparatus of claim 11, comprising a servomechanism operably connected with the pressure sensor and the adjustable control valve, said servomechanism being operable to increase the flow of compressed gas through the adjustable control valve when the measured pressure in the flexible enclosure falls below a minimum pressure, and to decrease the flow of compressed gas through the adjustable control valve when the measured pressure in the flexible enclosure exceeds a maximum pressure.

13. The apparatus of claim 8, comprising an air outlet valve connected with the flexible enclosure, said air outlet valve being operable in a sealed position to substantially prevent the release of gas from the flexible enclosure, and an unsealed position to permit the release of gas from the flexible enclosure.

14. A method for enhancing circulation in a patient's extremity, comprising the steps of:

    A. placing the extremity in a flexible enclosure adapted to surround the extremity;

    B. connecting the flexible enclosure to a source of compressed gas, said source of compressed gas being operable to inflate the flexible enclosure with gas to create an internal pressure in the flexible enclosure and apply external pressure to the patient's extremity;

C. monitoring the patient's arterial pulse to detect the arrival of the arterial pulse into the extremity;

D. inflating the flexible enclosure with gas to apply external pressure to the extremity after the arrival of the arterial pulse into the extremity;

E. releasing gas from the flexible enclosure to remove external pressure from the patient's extremity;

F. measuring the internal pressure in the flexible enclosure as external pressure is applied to and removed from the patient's extremity; and

G. automatically adjusting the flow of gas into the flexible enclosure in response to the measured internal pressure in the flexible enclosure to maintain the internal pressure within a preferred pressure range.

15. The method of claim 14, wherein the step of automatically adjusting the flow of gas into the flexible enclosure comprises:

A. sending an input signal to a servomechanism when the internal pressure in the flexible enclosure falls outside the preferred pressure range; and

B. sending an output signal from the servomechanism to an adjustable control valve operable to regulate the flow of gas into the flexible enclosure.